

ANNUAL REPORT FOR 2003



Deer Creek Mitigation Site
Carteret County
Project No. 6.16901T
TIP No. R-2105 WM



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SUMMARY

The following report summarizes the monitoring activities that have occurred in the past year at the Deer Creek Mitigation Site. Located in Carteret County, the Deer Creek Site serves as mitigation for impacts associated with the widening of NC 24. The site was originally designed to serve as integration between an onsite stormwater detention facility and the surrounding environment. The site was constructed and planted in Spring 2001; however, initial vegetation failure led to a replanting of the site in the spring of 2002. Monitoring activities in 2003 represent the third year of hydrologic monitoring and the second year restart of vegetation monitoring.

The site must be monitored for five years following site construction or until success criteria are met. Monitoring criteria includes the percent cover of planted herbaceous vegetation and the hydrologic conditions at the site. The site is monitored with thirty vegetation plots, three surface water gauges, and one rain gauge. Data analysis includes an examination of all recorded site data as well as an assessment of local climate conditions throughout the growing season.

Hydrologic monitoring was conducted for a third year. The three surface water monitoring gauges on the site show consistent inundation throughout the growing season. An examination of the water levels over a two-day period illustrates that the site floods twice a day in average climatic conditions (as required in the permit conditions). The two days in the plot were chosen at random and represent typical conditions during the growing season.

For 2003 monitoring, the vegetation revealed a frequency of target species at 78.3% and the vegetative coverage scale value was calculated at 3.52. Thus, the vegetation data for 2003 met the 70% required frequency of target species and is on track to meet the scale value of 5 for the vegetative coverage that is required in year five.

NCDOT recommends that both hydrologic and vegetation monitoring continue at the Deer Creek Mitigation Site.

1.0 INTRODUCTION

1.1 Project Description

The Deer Creek Mitigation Site is located in Carteret County on the north side of NC 24 at the northeast quadrant of the crossing of Deer Creek (see Figure 1 Location Map). The mitigation site is approximately 4.25 acres in size. Approximately 1.5 acres of the site had previously been allocated as a stormwater detention facility designed for the NCDOT to treat runoff from the improvements associated with the widening of NC 24 (TIP No. R-2405AB). The existing Section 404 permit for widening NC 24 involves a commitment by NCDOT to better integrate the original 1.5-acre stormwater detention basin into the existing natural environment. To accommodate this, the NCDOT purchased the remaining 2.75 acres of land with the intent of utilizing the area to provide compensatory mitigation for wetland impacts associated with this TIP project.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted. Vegetation will be monitored for five years following the completion of planting and vegetative marsh success is determined in accordance with NMFS guidelines. The site will be considered hydrologically successful when the hydrologic data shows that the site is flooded twice daily. The following report details the results of hydrologic and vegetative monitoring during 2003 at the Deer Creek Mitigation Site.

1.3 Project History

| | |
|--------------------------|---------------------------------------|
| March 2001 | Construction completed |
| May 2001 | Site Planted |
| June 2001 | Gauges Installed |
| June –November 2001 | Hydrologic Monitoring (1 yr.) |
| August 2001 | Vegetation Monitoring (1 yr.) |
| April 2002 | Site Tilled and Replanted |
| February – November 2002 | Hydrologic Monitoring (2 yr.) |
| August 2002 | Vegetation Monitoring (Restart 1 yr.) |
| December 2002 | Spillway Modifications |
| February – November 2003 | Hydrologic Monitoring (3 yr.) |
| August 2003 | Vegetation Monitoring (2 yr.) |

1.4 Debit Ledger

The Deer Creek Mitigation Site serves entirely as onsite mitigation for R-2105.

[illegible]

2.0 HYDROLOGY

2.1 Success Criteria

The success of this site is correlated to the planting elevations and to planting success. If the plantings are successful, then the grading will have been correctly correlated to the tidal fluctuations. The hydrologic monitoring aspect will involve the use of surface water monitoring gauges. Groundwater monitoring is not required at this site since it is a tidal system. The site will be considered hydrologically successful when the site is flooded twice daily. Success is determined from data taken at the Gauge 1 location (SG-1), as the other gauges are located within channels and are used for comparison of tidal elevations. It is expected that the surface water flooding will be the same as that measured for the biological benchmarks for *Spartina alterniflora*, since the grading was done to an elevation that is known to be periodically flooded. Table 1 describes each gauge and the hydrologic expectations of each. See Figure 2 for the precise location of each gauge.

Table 1. Gauge Description and Expectations

| Gauge | Elevation | Location | Hydrologic Expectation |
|-------|-----------|--|------------------------------------|
| SG-1 | 1.20 ft | Low marsh between channel and high marsh | Flood twice daily |
| SG-2 | -0.64 ft | Within constructed channel of site | Remain flooded, daily fluctuations |
| SG-3 | -0.54 ft | In Deer Creek adjacent to site | Remain flooded, daily fluctuations |

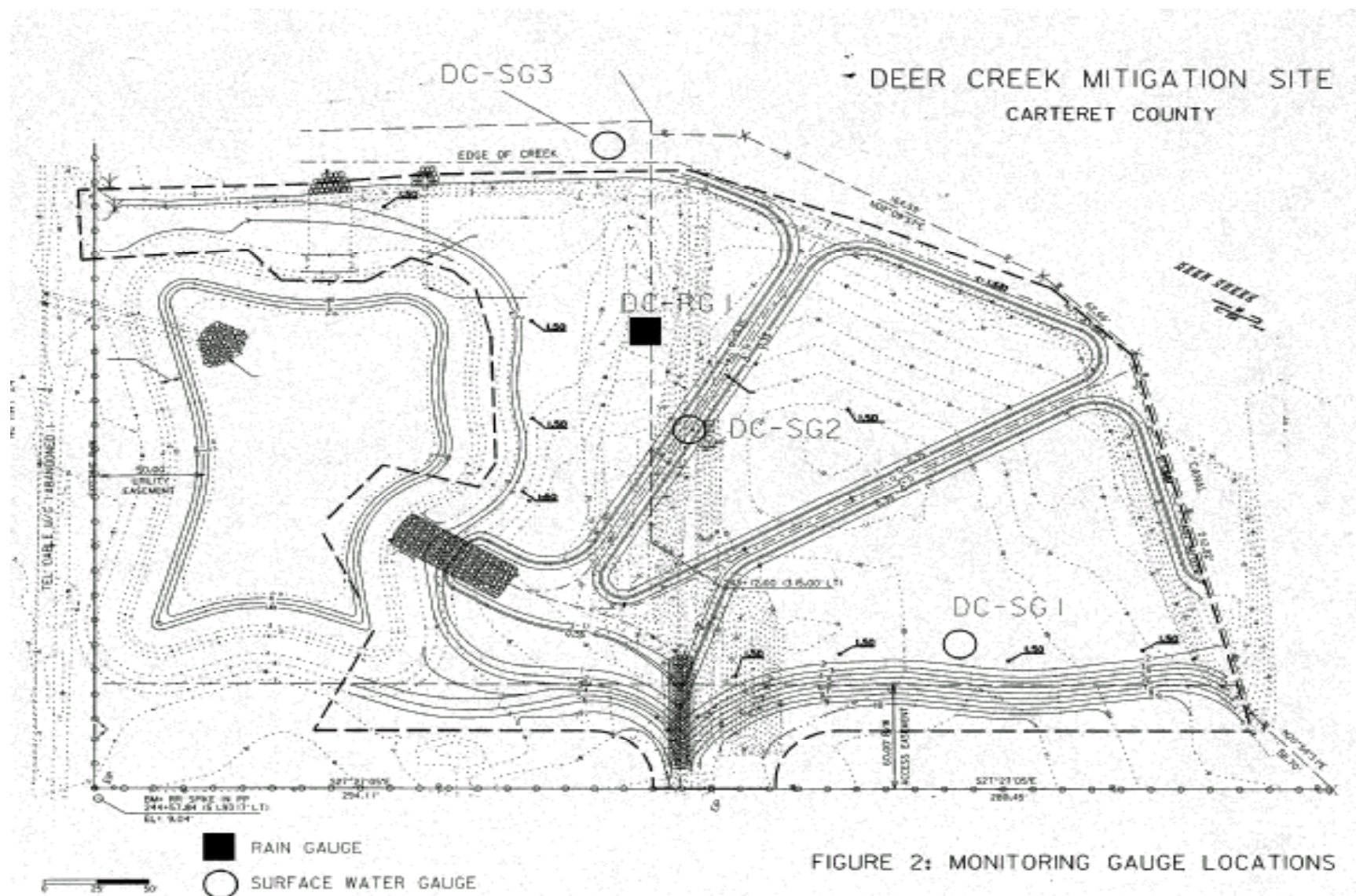
The site will be monitored during the growing season. The growing season in Carteret County begins February 27 and ends November 29 and is 274 days long. These dates correspond to a 50% probability that temperatures will drop to 28° F or lower after February 27 and before November 29.

2.2 Hydrologic Description

Three surface water monitoring gauges and one rain gauge were installed onsite in June 2001 (Figure 2). The surface water gauges record surface water readings every hour. The Infinites rain gauge records rainfall amounts on a daily basis.

Appendix A contains two plots of the data at each surface gauge location. The first set of data plots shows the depth of surface water recorded by each gauge. The second set of plots shows the surface water recorded against the actual gauge elevation surveyed relative to mean sea level. Precipitation events are included on each graph as bars. The plotted rainfall was obtained from the onsite rain gauge. Also included in Appendix A is a plot of two days of surface water data recorded at the Gauge 1 location; this plot is to illustrate (that flooding occurs twice daily as required in the permit conditions). The two days in the plot were chosen at random and are representative of conditions throughout the growing season.

Figure 2. Gauge Location Map



2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

Gauge 1 was evaluated to determine if the site was being flooded twice daily. Tide data from Gauges 2 and 3 were evaluated for comparison.

Due to the relatively small size of the site, high tide elevations should be consistent between the three gauges. Appendix A shows both the true elevation plots for all three gauges, as well as an individual graph of Gauge 1 data that shows a two-day sample; this graph demonstrates the twice daily heightened water levels common throughout the growing season.

2.3.2 Climatic Data

Figure 3 is a comparison of 2002 and 2003 monthly rainfall to historical precipitation for the area. The two lines represent the 30th and 70th percentiles of monthly precipitation for Morehead City, NC. These percentiles represent monthly rainfall data collected between 1972 and 2003. The NC State Climate Office provided all historical and current monthly rainfall data for Morehead City.

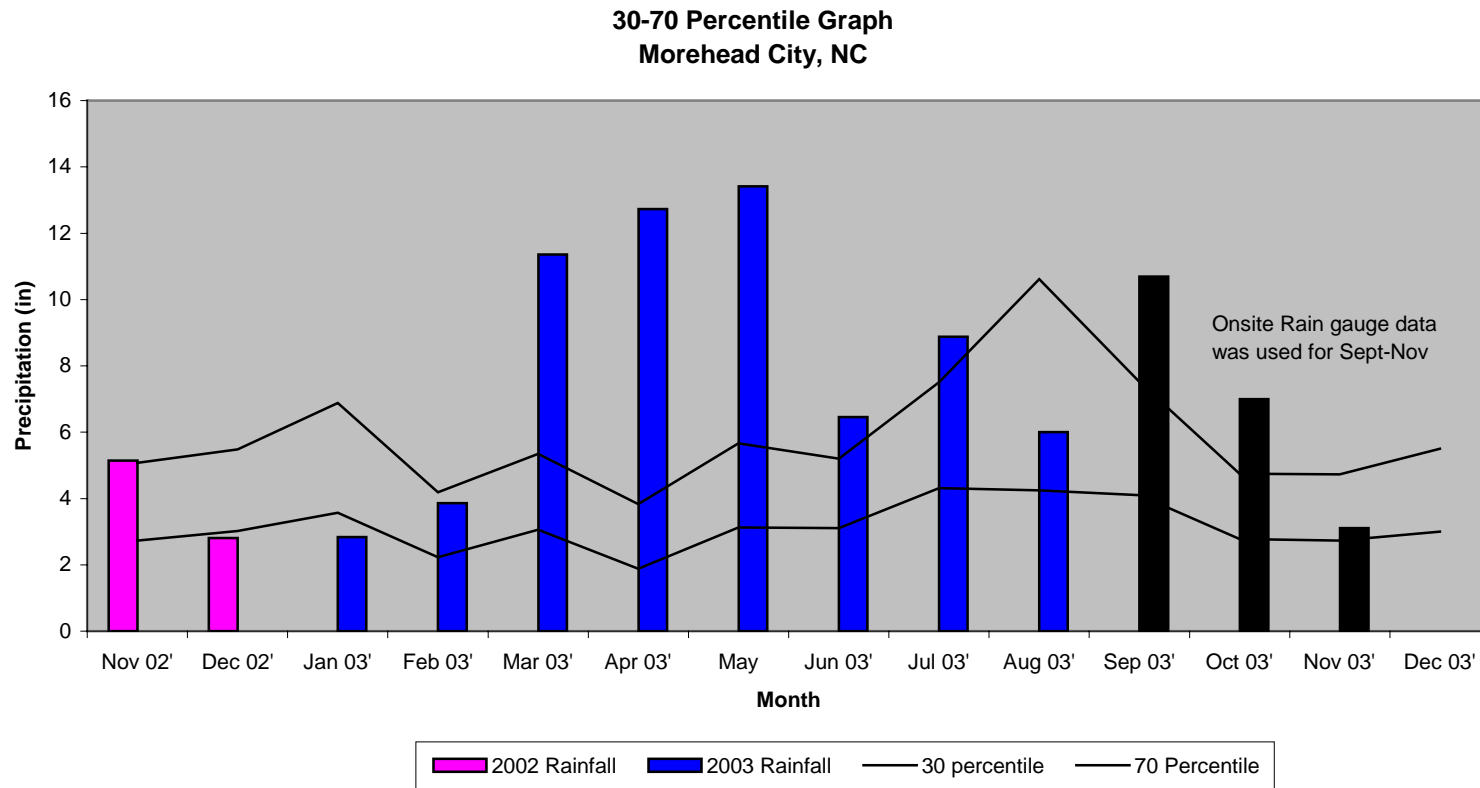
For the 2003-year, March, April, May, June, July, September, and October experienced above average rainfall. The months of December (02') and January recorded below average rainfall for the site. November (02'), February, August, and November experienced average rainfall. Overall, the site met hydrologic criteria in a year of above average climate conditions; however, rainfall is not the primary hydrologic influence for the site.

2.4 Conclusions

Based on the analysis of hydrology for Gauge 1, the data indicates that the gauge is flooding twice daily for the majority of the growing season, as is required. The surface water elevations for Gauge 1 are comparable with Gauge 2 and Gauge 3.

NCDOT will continue to monitor the site for hydrology.

Figure 3. Deer Creek 30-70 Percentile Graph



3.0 VEGETATION: DEER CREEK (YEAR 2 MONITORING)

3.1 Success Criteria

The vegetative marsh success of the wetland site will be determined in accordance with NMFS Guidelines. Monitoring plots found to be located within the open water channel will not be evaluated, and will not count toward the final count of plots. The vegetation component of the wetland site will be deemed successful if the following criteria are met:

1. At year five, the average of all plots should have a scale value of 5 (75% vegetative cover) consisting of wetland herbaceous species, not including any invasive species.
2. A minimum of 70% of the plots shall contain the target (planted) species.

3.2 Description of Species

The following marsh grass species were planted in the Wetland Restoration Area:

Spartina patens, Saltmeadow Cordgrass

Spartina alterniflora, Smooth Cordgrass

3.3 Results of Vegetation Monitoring

Table 2: Vegetation Monitoring Results

| Plot # | Scale Factor | <i>Spartina patens</i> | <i>Spartina alterniflora</i> | Frequency | Comments |
|--|--------------|------------------------|------------------------------|-----------|----------------------|
| 1 | 4.0 | | ■ | ■ | |
| 2 | 0.0 | | | | bare ground |
| 3 | 5.0 | | ■ | ■ | |
| 4 | 0.0 | | | | open water |
| 5 | 5.0 | | ■ | ■ | <i>Baccharis</i> sp. |
| 6 | 5.0 | | ■ | ■ | |
| 7 | 3.0 | | ■ | ■ | |
| 8 | 5.0 | | ■ | ■ | |
| 9 | 0.0 | | | | open water |
| 10 | 0.0 | | | | open water |
| 11 | 5.0 | | ■ | ■ | |
| 12 | 0.0 | | | | open water |
| 13 | 5.0 | | ■ | ■ | |
| 14 | 0.0 | | | | bare ground |
| 15 | 0.0 | | | | open water |
| 16 | 0.0 | | | | open water |
| 17 | 0.0 | | | | bare ground |
| 18 | 3.0 | | ■ | ■ | |
| 19 | 4.0 | | ■ | ■ | |
| 20 | 5.0 | | ■ | ■ | |
| 21 | 5.0 | ■ | ■ | ■ | |
| 22 | 5.0 | | ■ | ■ | |
| 23 | 5.0 | | ■ | ■ | |
| 24 | 5.0 | | ■ | ■ | |
| 25 | 0.0 | | | | bare ground |
| 26 | 3.0 | | ■ | ■ | |
| 27 | | | | | out of bounds |
| 28 | 0.0 | | | | bare ground |
| 29 | 5.0 | | ■ | ■ | |
| 30 | 4.0 | | ■ | ■ | |
| Frequency (Percentage of Plots with Desired Species) | | 4.3% | 78.3% | 78.3% | |
| Sum Scale Value | | | | 81.0 | |
| Total Number of Plots | | | | 23 | |
| Vegetative Cover (Scale Value) | | | | 3.52 | |
| | | | | | |

3.4 Conclusions

Percent Frequency of Target Species **78.3%**
Frequency of 70% required.

Vegetative Cover Scale Value **3.52**
Scale Value of 5 required for year 5.

The site was tilled to reduce compaction and was fertilized and replanted with 7,300 Smooth Cordgrass plants in April 2002. Vegetation on the site has significantly improved. Frequency and coverage are on track for Year 2.

NCDOT will continue vegetation monitoring at the Deer Creek Mitigation Site.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

The 2003-monitoring year represents the third year of hydrology monitoring and the second year of vegetation monitoring following replanting of the site.

Hydrologic monitoring of the three surface water gauges indicated that the site was consistently inundated, with surface water levels varying with the tides. Vegetation monitoring yielded a successful 78.3% frequency of target species and 3.52 vegetative coverage. Field observations have shown that the site is regularly flooded.

Based upon the 2003 results, NCDOT recommends that both hydrologic and vegetation monitoring continue.

APPENDIX A
GAUGE DATA GRAPHS

APPENDIX B
SITE PHOTOGRAPHS

Deer Creek



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7

APPENDIX C
VEGETATION PLANTING PLAN

